FIG. 1

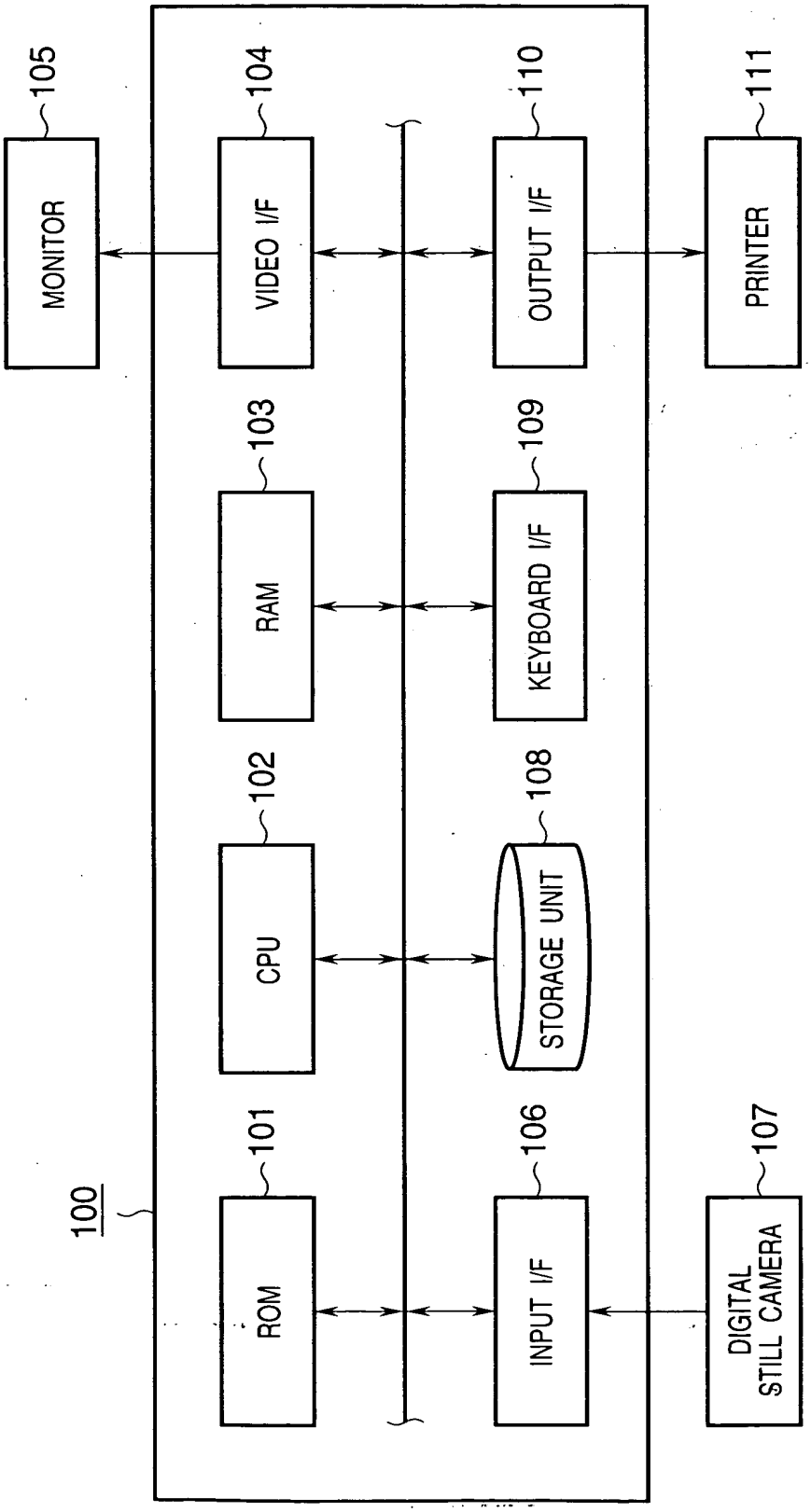

100
MONITOR
105
VIDEO I/F
104
OUTPUT I/F
110
PRINTER
111
RAM
103
KEYBOARD I/F
109
CPU
102
STORAGE UNIT
108
ROM
101
INPUT I/F
106
DIGITAL STILL CAMERA
107

FIG. 2

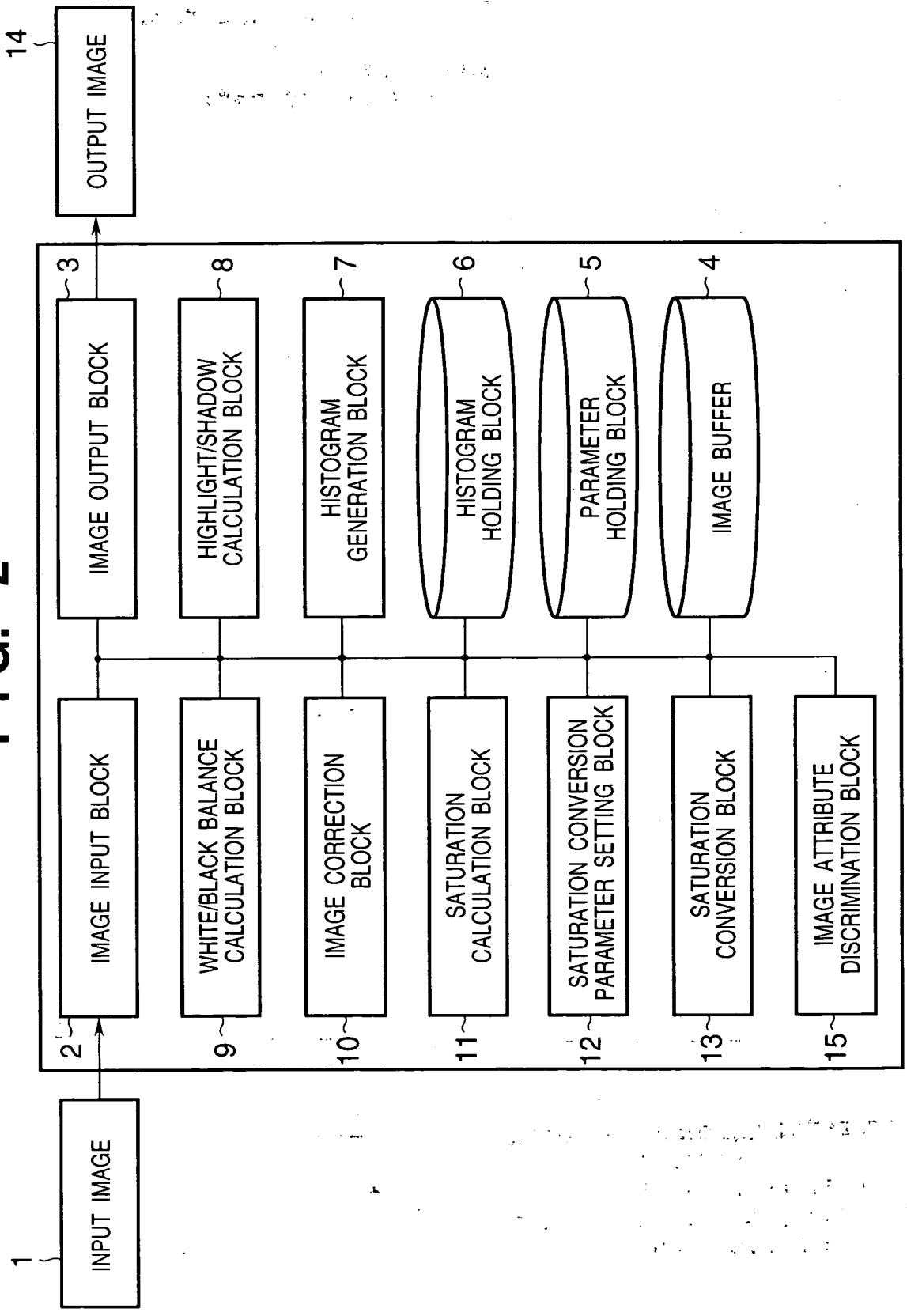

1
INPUT IMAGE
2
IMAGE INPUT BLOCK
3
IMAGE OUTPUT BLOCK
4
IMAGE BUFFER
5
PARAMETER HOLDING BLOCK
6
HISTOGRAM HOLDING BLOCK
7
HISTOGRAM GENERATION BLOCK
8
HIGHLIGHT/SHADOW CALCULATION BLOCK
9
WHITE/BLACK BALANCE CALCULATION BLOCK
10
IMAGE CORRECTION BLOCK
11
SATURATION CALCULATION BLOCK
12
SATURATION CONVERSION PARAMETER SETTING BLOCK
13
SATURATION CONVERSION BLOCK
14
OUTPUT IMAGE
15
IMAGE ATTRIBUTE DISCRIMINATION BLOCK

FIG. 3

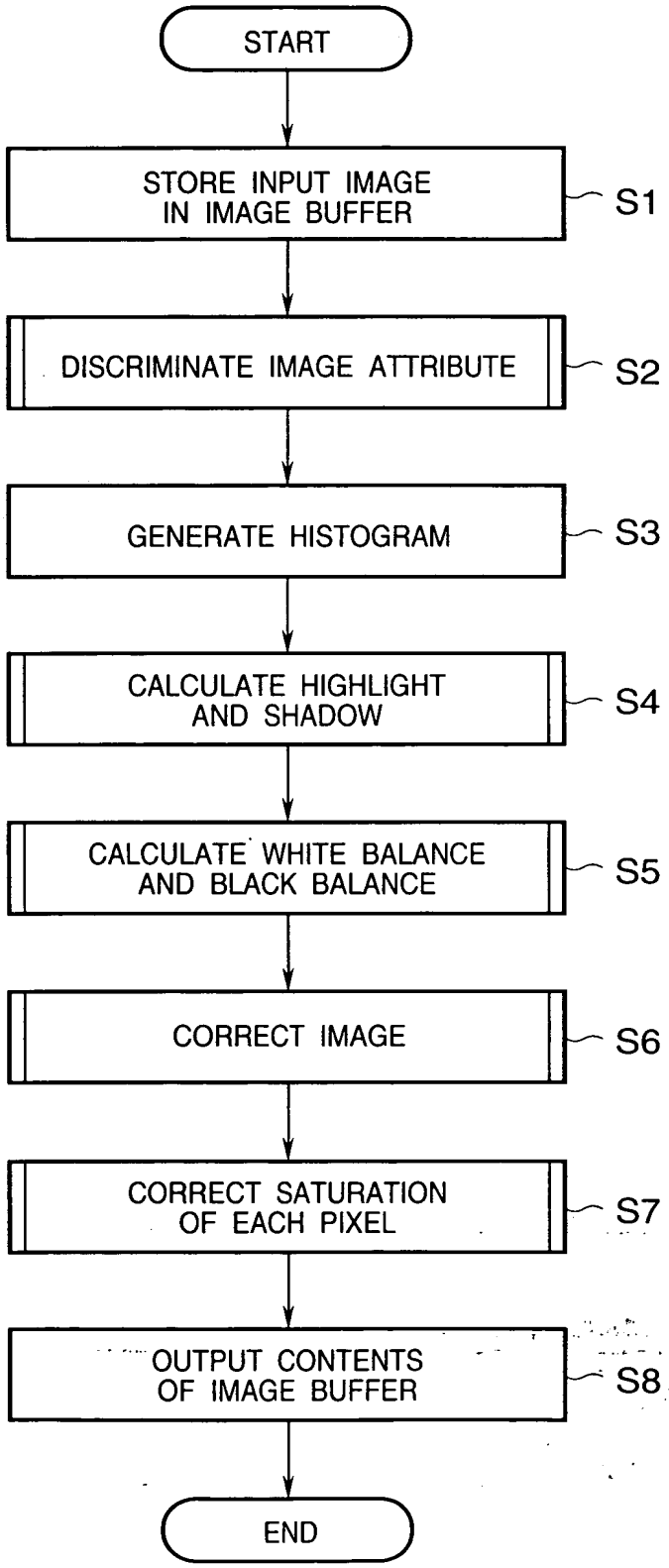

START
STORE INPUT IMAGE IN IMAGE BUFFER
S1
DISCRIMINATE IMAGE ATTRIBUTE
S2
GENERATE HISTOGRAM
S3
CALCULATE HIGHLIGHT AND SHADOW
S4
CALCULATE WHITE BALANCE AND BLACK BALANCE
S5
CORRECT IMAGE
S6
CORRECT SATURATION OF EACH PIXEL
S7
OUTPUT CONTENTS OF IMAGE BUFFER
S8
END

FIG. 4

ITEM	VALUE
HIGHLIGHT POINT OF IMAGE(LH)	###
WHITE BALANCE RED(RH)	###
WHITE BALANCE GREEN(GH)	###
WHITE BALANCE BLUE(BH)	###
CORRECTED HIGHLIGHT POINT(HP)	###
HIGHLIGHT AREA	##%~##%
SHADOW POINT OF IMAGE(LS)	###
BLACK BALANCE RED(RS)	###
BLACK BALANCE GREEN(GS)	###
BLACK BALANCE BLUE(BS)	###
CORRECTED SHADOW POINT(SP)	###
SHADOW AREA	##%~##%
LOW-SATURATION SIDE SATURATION CONVERSION PARAMETER	###
HIGH-SATURATION SIDE SATURATION CONVERSION PARAMETER	###
ATTRIBUTE DEPENDENT SATURATION A (FLESH TONE)	###
ATTRIBUTE DEPENDENT SATURATION B (GREEN OF PLANT)	###
ATTRIBUTE DEPENDENT SATURATION C (BLUE OF SKY)	###

FIG. 5

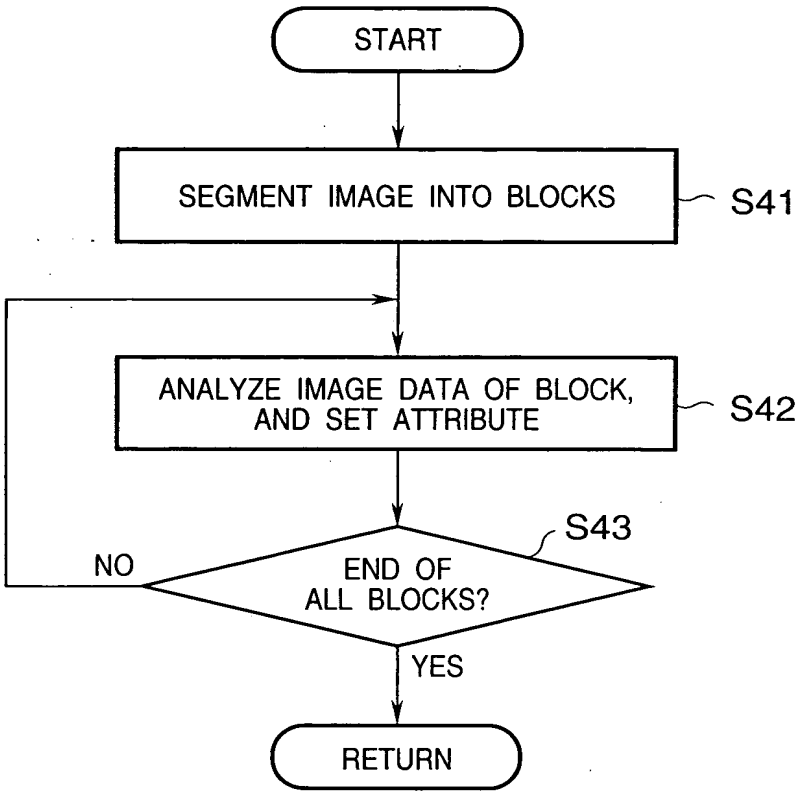

START
SEGMENT IMAGE INTO BLOCKS
S41
ANALYZE IMAGE DATA OF BLOCK, AND SET ATTRIBUTE
S42
S43
NO
END OF ALL BLOCKS?
YES
RETURN

FIG. 6A

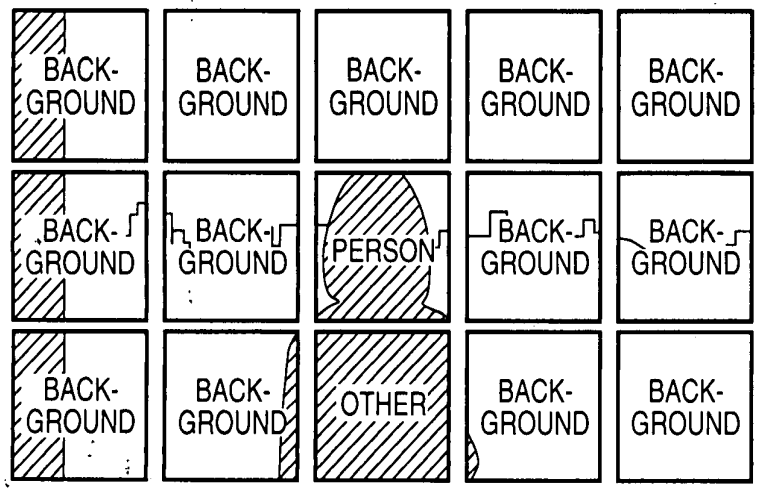

BACK-GROUND
BACK-GROUND
BACK-GROUND
BACK-GROUND
BACK-GROUND
BACK-GROUND
BACK-GROUND
PERSON
BACK-GROUND
BACK-GROUND
BACK-GROUND
BACK-GROUND
OTHER
BACK-GROUND
BACK-GROUND

FIG. 6B

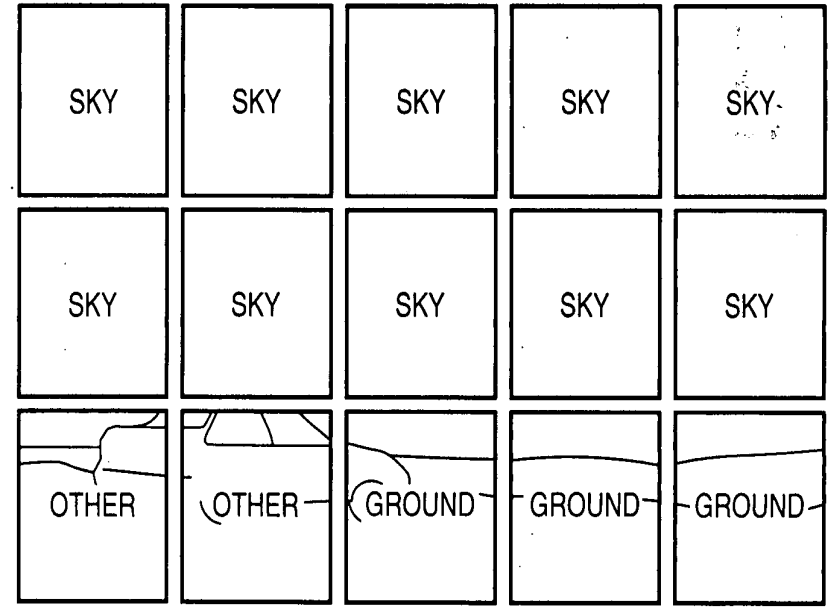

SKY
SKY
SKY
SKY
SKY
SKY
SKY
SKY
SKY
SKY
OTHER
OTHER
GROUND
GROUND
GROUND

FIG. 7

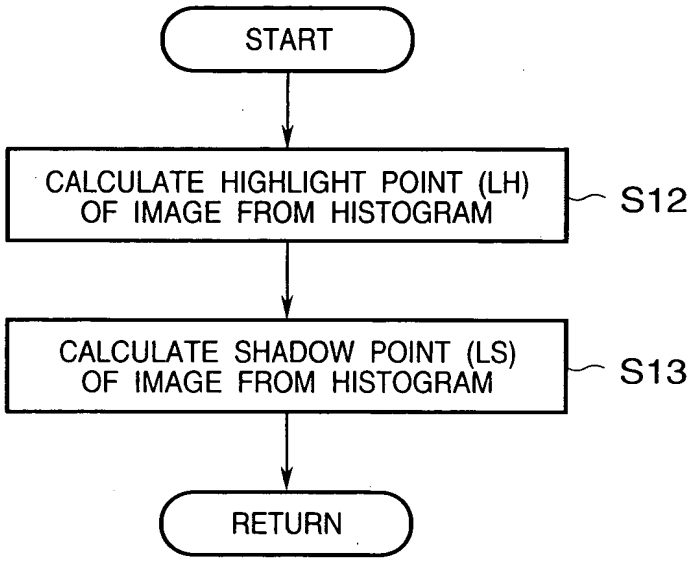

START
CALCULATE HIGHLIGHT POINT (LH) OF IMAGE FROM HISTOGRAM
S12
CALCULATE SHADOW POINT (LS) OF IMAGE FROM HISTOGRAM
S13
RETURN

FIG. 8

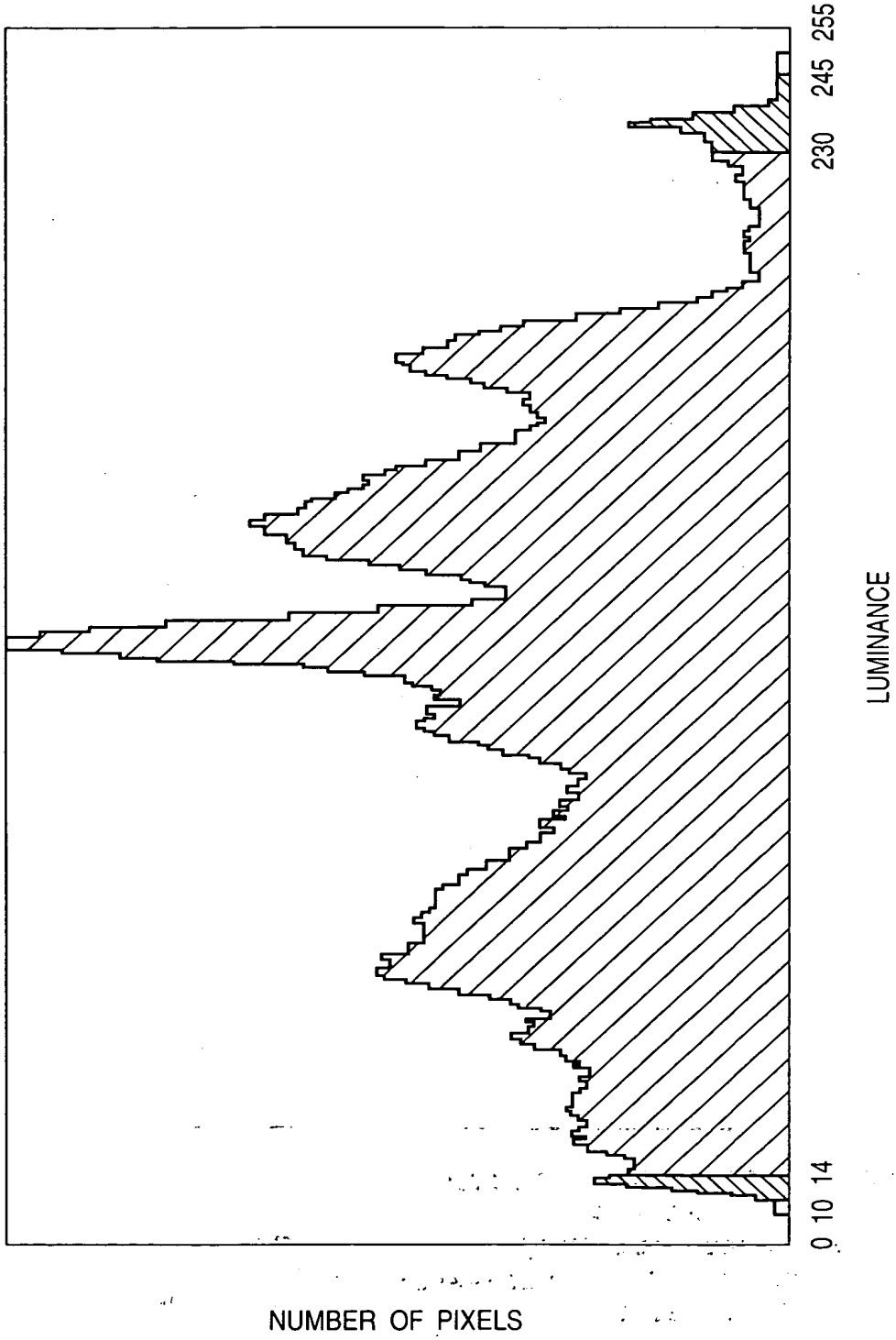


FIG. 9

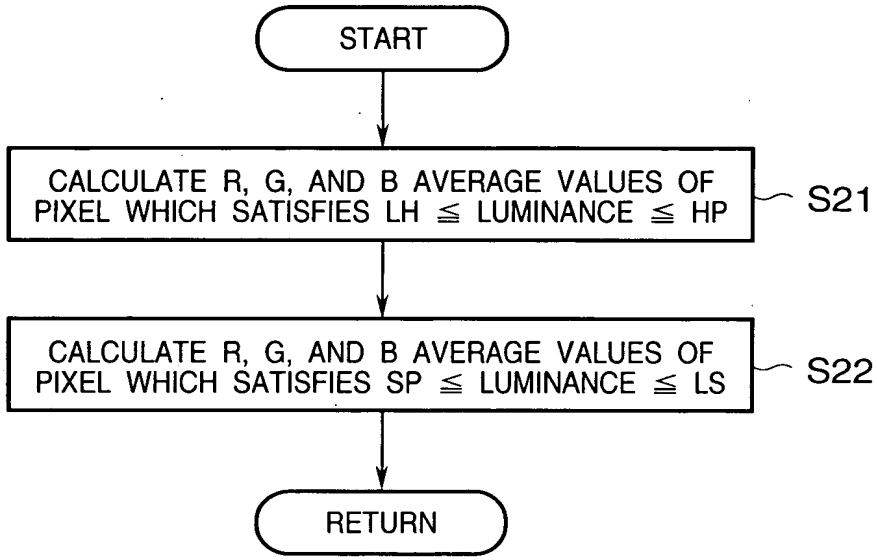

START
CALCULATE R, G, AND B AVERAGE VALUES OF PIXEL WHICH SATISFIES LH ≦ LUMINANCE ≦ HP
S21
CALCULATE R, G, AND B AVERAGE VALUES OF PIXEL WHICH SATISFIES SP ≦ LUMINANCE ≦ LS
S22
RETURN

FIG. 10

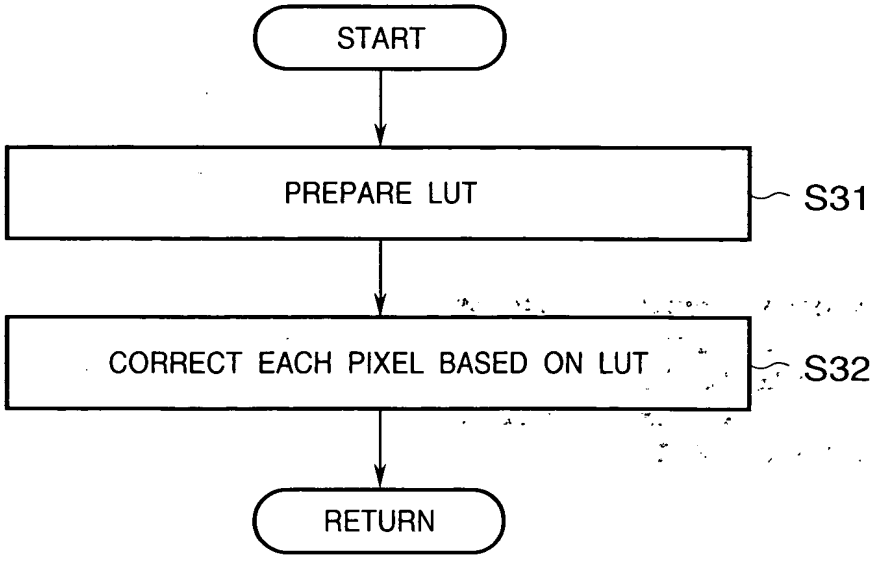

START
PREPARE LUT
S31
CORRECT EACH PIXEL BASED ON LUT
S32
RETURN

FIG. 11

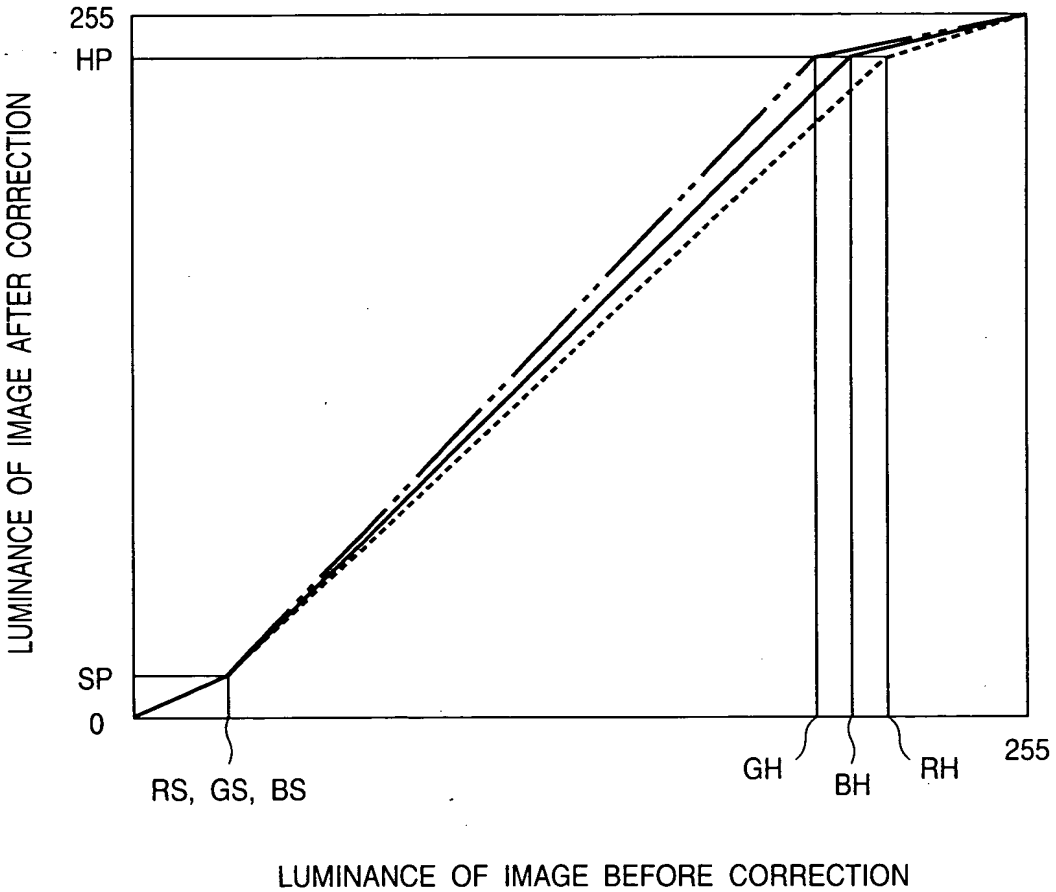

255
HP
SP
0
LUMINANCE OF IMAGE AFTER CORRECTION
RS, GS, BS
GH
BH
RH
255
LUMINANCE OF IMAGE BEFORE CORRECTION

FIG. 12

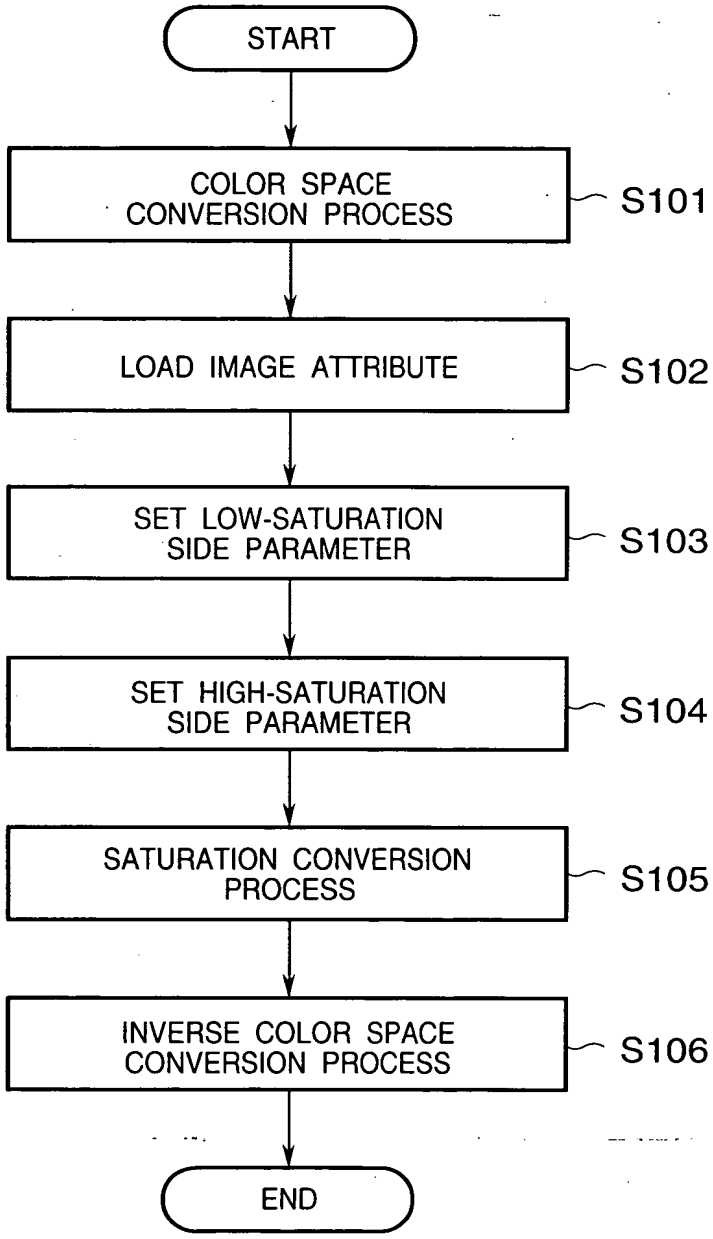

START
COLOR SPACE CONVERSION PROCESS
S101
LOAD IMAGE ATTRIBUTE
S102
SET LOW-SATURATION SIDE PARAMETER
S103
SET HIGH-SATURATION SIDE PARAMETER
S104
SATURATION CONVERSION PROCESS
S105
INVERSE COLOR SPACE CONVERSION PROCESS
S106
END

FIG. 13

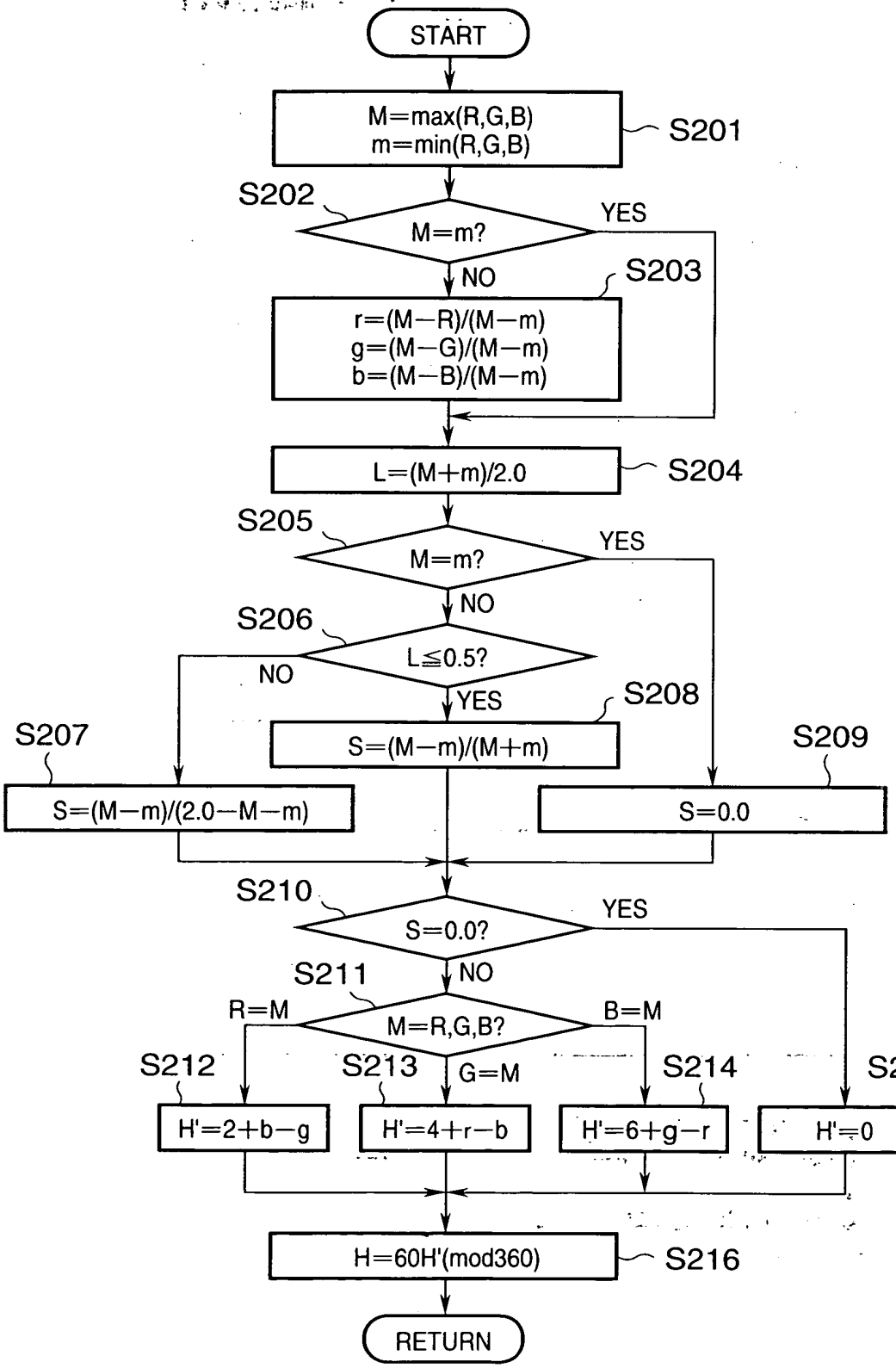

START
M=max(R,G,B)
m=min(R,G,B)
S201
S202
M=m?
YES
NO
S203
r=(M−R)/(M−m)
g=(M−G)/(M−m)
b=(M−B)/(M−m)
L=(M+m)/2.0
S204
S205
M=m?
YES
NO
S206
L≦0.5?
NO
YES
S208
S207
S=(M−m)/(M+m)
S209
S=(M−m)/(2.0−M−m)
S=0.0
S210
S=0.0?
YES
NO
S211
R=M
M=R,G,B?
B=M
S212
S213
G=M
S214
S215
H'=2+b−g
H'=4+r−b
H'=6+g−r
H'=0
H=60H'(mod360)
S216
RETURN

FIG. 14

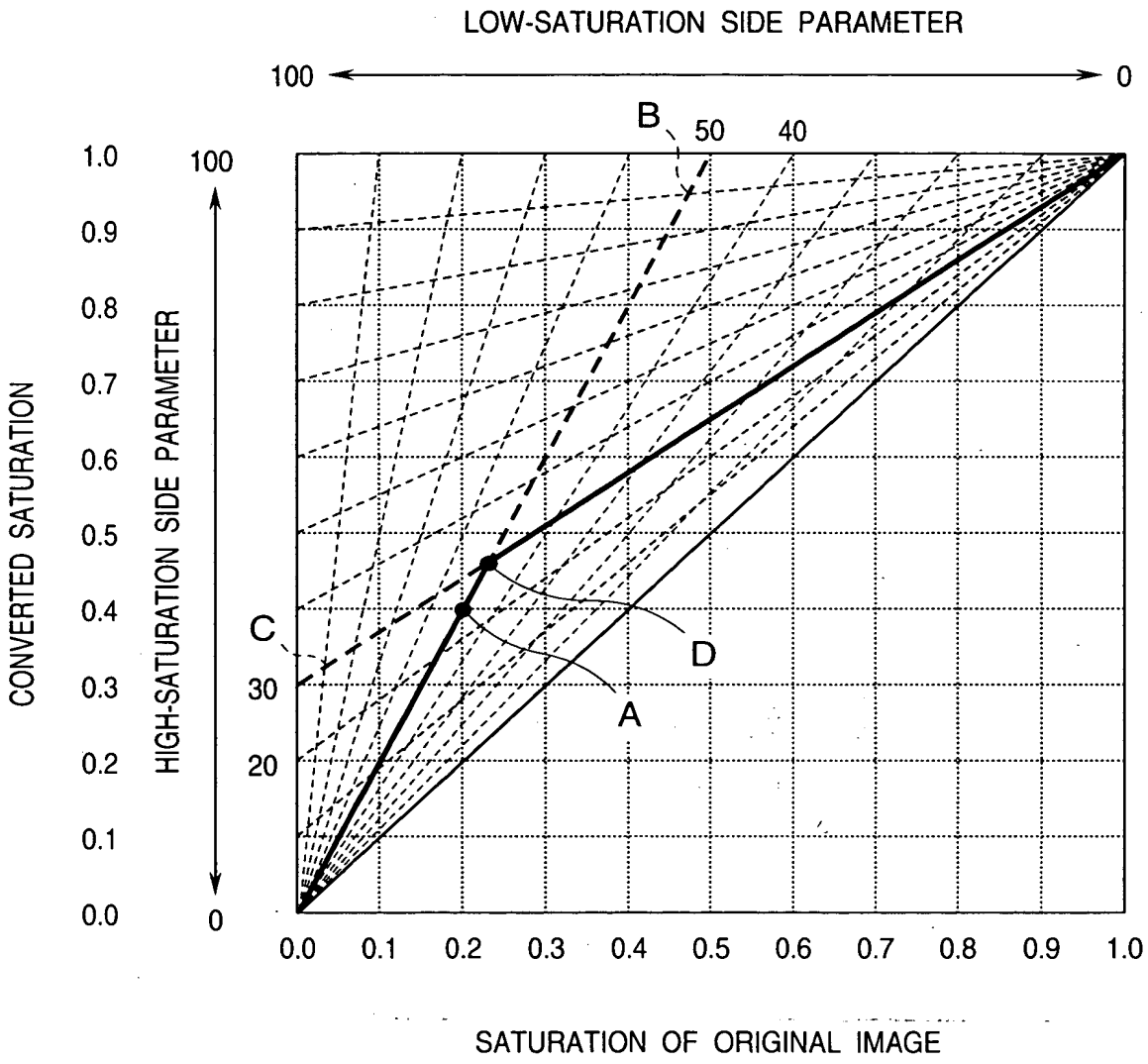

LOW-SATURATION SIDE PARAMETER
100
0
B
50
40
1.0
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0.0
100
HIGH-SATURATION SIDE PARAMETER
0
CONVERTED SATURATION
C
30
20
D
A
0.0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
1.0
SATURATION OF ORIGINAL IMAGE

FIG. 15

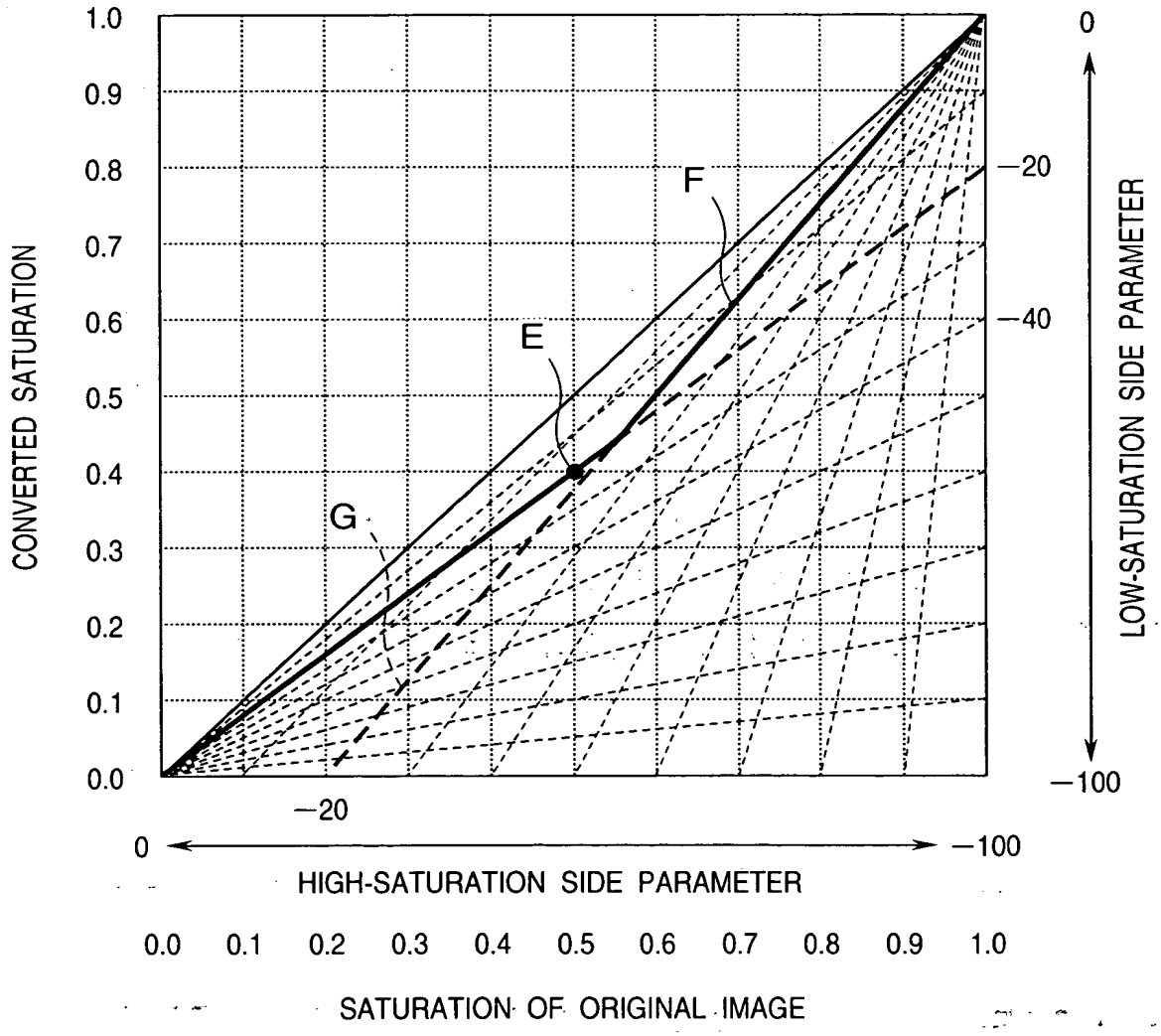
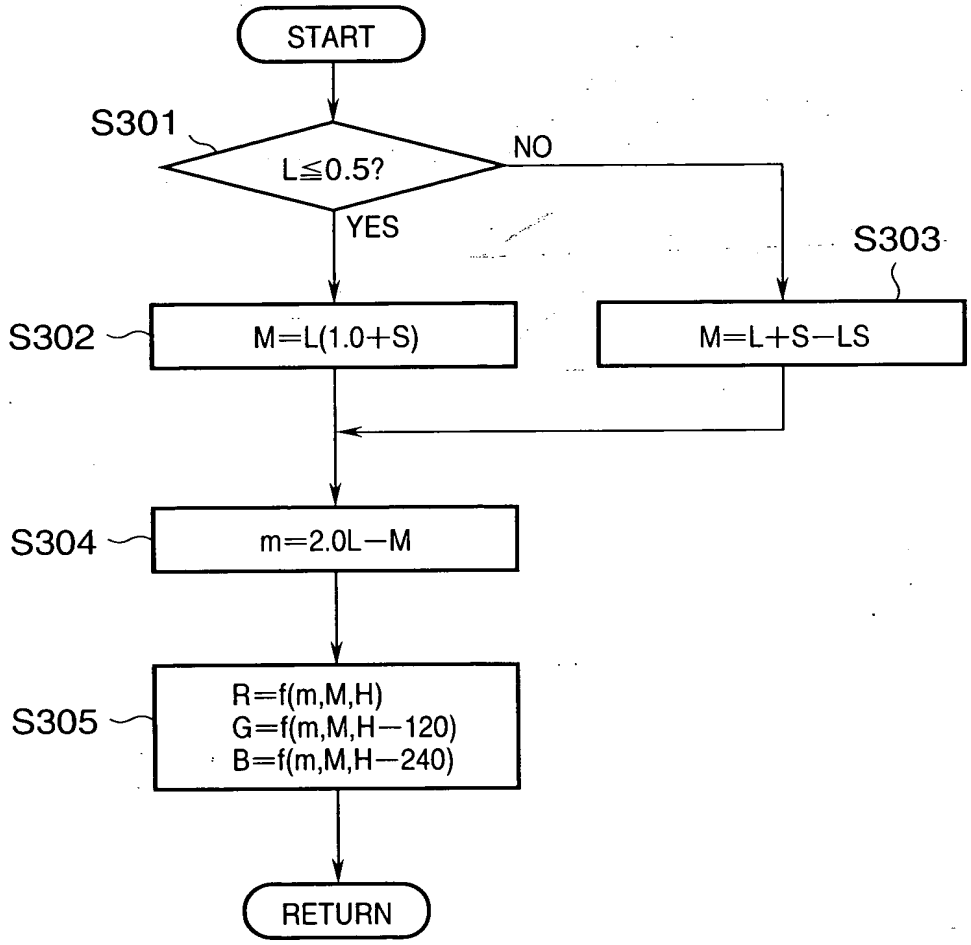

1.0
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0.0
CONVERTED SATURATION
F
E
G
0
−20
−40
−100
LOW-SATURATION SIDE PARAMETER
−20
0
−100
HIGH-SATURATION SIDE PARAMETER
0.0 0.1 0.2 0.3 0.4 0.5 0.6 0.7 0.8 0.9 1.0
SATURATION OF ORIGINAL IMAGE

FIG. 16


START
S301
L≦0.5?
NO
YES
S303
S302
M=L(1.0+S)
M=L+S−LS
S304
m=2.0L−M
S305
R=f(m,M,H)
G=f(m,M,H−120)
B=f(m,M,H−240)
RETURN